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10/601,547	06/24/2003	Shoude Chang	14756-US	7787

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EXAMINER	
CAPUTO, LISA M	
ART UNIT	**PAPER NUMBER**
2876	

DATE MAILED: 10/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/601,547	CHANG ET AL.	
	Examiner	Art Unit	
	Lisa M. Caputo	2876	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-23 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-23 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 24 June 2003 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 09/03;11/04.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because they are informal (i.e. the Figures are not clearly drawn and some of the reference numbers for Figure 1 are not legible). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Reference number 18 is in the description on page 7, lines 20-21 but is not in the Figures. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are

required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Reference number 16 is in Figure 2 but is not mentioned in the specification. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The abstract of the disclosure is objected to because the word "described" appears. Correction is required. See MPEP § 608.01(b).

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

5. The disclosure is objected to because of the following informalities:

Regarding page 7, lines 20-21: The reference number for "object 18" should be replaced with --object 16-- in order to be consistent with Figure 2. It seems as though this was a typographical error because reference number 16 seems to be the object surface in Figure 2 but instead, the reference number 18 is mentioned in the specification as the surface of the object. Also see objection to Figures above.

Appropriate correction is required.

Claim Objections

6. Claims 18 and 22 are objected to because of the following informalities:

Regarding claim 18, insert the words wherein said between "claim 17" and "processor" in order for the claim to be grammatically correct.

Regarding claim 22, "said bundle of optical fibers" does not have antecedent basis in claim 20. It seems as though claim 22 should be dependent on claim 21, not claim 20.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-11 are rejected under 35 U.S.C. 102(b) as being anticipated by McGrew (U.S. Patent Application Publication No. 2002/0021003).

McGrew teaches a quantum dot security device and method. Regarding claim 1, McGrew teaches a method of encoding data onto an object, comprising preparing a carrier medium (paper stock bearing an adhesive coating and peel-off paper backing 420) containing quantum dots (quantum dots 410) selected to give the carrier medium defined fluorescent emission characteristics encoding predetermined information (fluorescent UV-curable ink 415) and applying the carrier medium to the object (self-adhesive labels 435 are used to apply the carrier medium to objects) (see Figure 3, paragraph 34).

Regarding claim 2, McGrew teaches that the concentration and type of the quantum dots are selected to give the carrier medium defined emission characteristics when it is taught that the quantum dots are prepared by known methods, and have a

distinctive distribution of sizes and optical properties of light 510 emitted by the dots. Further, McGrew teaches that the reader of the label 435 of Figure 3 gathers emitted fluorescence 660 from the illuminated label and analyzes its spectral and temporal properties (see Figures 2-3, paragraphs 33 and 35).

Regarding claim 3, McGrew teaches that the carrier medium comprises an ink that is applied to the object in the form of a microscopic drop when it is taught that the typical size of the quantum dot that is used to make the UV-curable ink is less than four nanometers, and hence a surface can hold as many as 6,250,000 quantum dots per square micron (see paragraph 46).

Regarding claim 4, McGrew teaches that a protective coating is applied over the microscopic drop when it is taught that each batch of dots is coated with a photo-activatable binding agent, such as dichromated gelatin (see paragraph 45).

Regarding claims 5-6, McGrew teaches that the ink further comprises polymer (or mix of polymers and solvents) additives in order to improve viscosity and adhesion properties when it is taught that each batch of dots is coated with a photo-activatable binding agent, such as dichromated gelatin, and furthermore, any substance or structure with binding specificity may be used in the replication process of quantum dot patterns that are utilized to make the ink (see paragraphs 45 and 65).

Regarding claims 7-9, McGrew teaches that the quantum dots are made from semiconductor materials, from the materials in IVA and VIA (i.e. Selenium), and further, are selected from the group consisting of cadmium selenide, cadmium sulfide, zinc selenide, and zinc sulfide when it is taught that a quantum-dot tagged UV-curable ink for

anti-counterfeit/security application may be made using CdSe quantum dots 500 surrounded by a cap 520 of ZnSe (see Figure 2, paragraph 33).

Regarding claim 10, McGrew teaches that quantum dots with different emission wavelengths are distributed homogeneously in the ink when it is taught that the density of quantum dots on a label or in a substance may be varied over any range of detectable densities, and excitation light may be varied between the longest wavelength and the shortest wavelength capable of exciting the particular quantum dots used and that the pattern of the quantum dots on a label may be predetermined, periodic, quasiperiodic, or random (see paragraphs 60-61).

Regarding claim 11, McGrew further teaches a method of decoding information encoded by the emission characteristics of quantum dots in a carrier medium comprising exciting the quantum dots in the carrier medium to initiate fluorescence and processing the resulting emission spectra to extract the decoded information when it is taught that the reader consists of an optical system that illuminates a selected region on a label with light of a suitable wavelength, such as 514-nm light for example. Further, the light is used to read a region of a label 690 printed with the quantum-dot tagged ink 415. The reader gathers emitted fluorescence 660 from the illuminated label and analyzes its spectral and temporal properties. A lens system 635 focuses the fluorescent light to a point, and a diffraction grating 615 spreads the fluorescent light into its spectrum on a line array 625 of photodetectors. Electronic circuits analyze the temporal behavior of the fluorescence by modulating the illumination light and comparing the modulation of the illumination light to the resulting modulation of the

emitted fluorescence. Furthermore, the reader may be combined with readers using other technology, such as a magnetic stripe reader in order to extract decoded information (see Figures 4-5, paragraphs 35-36).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew in view of Brown et al. (U.S. Patent Application Publication No. 2003/0047100, from hereinafter "Brown"). The teachings of McGrew have been discussed above.

Regarding claims 12-13, McGrew fails to specifically teach that the emission spectra are processed to remove noise and ensure spectral line separation and that the noise is removed with a digital filter.

Brown teaches a method for continuously checking the production of security printing machines that utilize security ink. Brown discloses that the control box represented on FIG. 9 has three connectors, one connector 41 for the machine and one connector 42, 43 for each detector. Connector 41 comprises the power supply for the control box and sensor and output signals for the machine control... All this information and all control box output signals (LEDS, relay and two open collectors) are controlled by the micro-controller 46. A digital filter inside the micro-controller 46 protects against electrical noise, fast short-circuits or fast signal interruptions on both detector lines. Although a detector of a magnetic property of security ink has been described, similar devices can also be used to monitor other invisible security features such as IR, fluorescence or phosphorescence (see paragraphs 32-34). Hence, Brown teaches the use of a digital noise filter within a system to detect encoded security inks, including fluorescent ones.

In view of the teaching of Brown, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a digital noise filter in order to ensure that noise is removed and that spectral line separation is obtained because extraneous noise is detrimental to a system where effective reading of certain information is necessary. It is favorable to use a digital filter since digital filters attain much better signal to noise ratios than analog filters, which allows for a more efficient system because less noise is interfering with the signal which contains the information.

10. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew as modified by Brown and further in view of Bawendi et al. (U.S. Patent No.

6,774,361, from hereinafter "Bawendi"). The teachings of McGrew as modified by Brown have been discussed above.

Regarding claims 14-15, McGrew as modified by Brown fails to teach that the spectral lines are separated by a deconvolution operation represented by an equation $\Sigma_i\ k(\lambda_i)\ \delta(\lambda - \lambda_i) = IFT\{FT[f(\lambda)]/FT[p(\lambda)]\}$.

Bawendi teaches an inventory control system that utilizes a barcode comprising one or more sizes of semiconductor nanocrystals (quantum dots) having characteristic spectral emissions. Bawendi discloses that the number of discrete emissions that can be distinctly observed for a given composition depends not only upon the monodispersity of the particles, but also on the deconvolution techniques employed. Quantum dots, unlike dye molecules, can be easily modeled as Gaussians and are therefore more easily and more accurately deconvoluted (see col 3, lines 22-39, col 7, lines 2-9).

In view of the teaching of Bawendi, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the deconvolution method in order to model the separation of the spectral lines because, as taught by Bawendi, the deconvolution method works well on quantum dots since they are modeled by Gaussians and are more accurately deconvoluted, which in turn allows for a more accurate reading of the information encoded within the quantum dots. This is favorable because it is necessary for the encoded information to be obtained properly in order for the system to run efficiently. Although Bawendi does not teach the specific equation, it would have been obvious to one of ordinary skill in the art at the time the invention was

made to discern that the equation used is a conventional deconvolution operation performed in the spectrum domain.

Regarding claim 16, McGrew as modified by Brown fails to teach that the information is extracted from the positions and intensities of spectral lines with reference to a predetermined code book.

Bawendi teaches that the identification of the item of interest from a collection of items can be effected by providing a primary light source and correlating the spectral emissions to a collection of quantum dots which encode a particular item of interest (see Figure 4, col 12, lines 24-64), in effect referencing a predetermined collection of patterns (i.e. code book).

In view of the teaching of Bawendi, it would have been obvious to one of ordinary skill in the art at the time the invention was made to reference a predetermined code book, or a collection of patterns because this will ensure that the extracted information is correct (i.e. the correlated information is based upon well known emission patterns), and hence the system will run efficiently and quickly.

11. Claims 17-18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi in view of McGrew.

Regarding claim 17, Bawendi teaches an apparatus for decoding information encoded by the emission characteristics of quantum dots in a carrier medium (object 50) comprising a light source for exciting the quantum dots to emit light, a spectroscopic detector for detecting the emitted light, and a means for extracting the encoded information from the emission characteristics of the quantum dots when it is taught that

the identification of the item of interest from a collection of items can be effected by providing a primary light source and correlating the spectral emissions to a collection of quantum dots which encode a particular item of interest (see Figure 4, col 12, lines 24-64). Furthermore, Bawendi discloses that the present invention utilizes a "barcode" comprising one or more particle size distributions of semiconductor nanocrystals (quantum dots), having characteristic spectral emissions, to either "track" the location of a particular item of interest or to identify a particular item of interest. The semiconductor nanocrystals used in the inventive "barcoding" scheme can be tuned to a desired wavelength to produce a characteristic spectral emission by changing the composition and size of the quantum dot, and additionally, the intensity of the emission at a particular characteristic wavelength can also be varied, thus enabling the use of binary or higher order encoding schemes. The information encoded by the quantum dots can be spectroscopically decoded, thus providing the location and/or identity of the particular item or component of interest (see col 3, lines 24-39).

Regarding claims 17 and 23, Bawendi fails to specifically disclose that a processor, and further a computer, extracts the encoded information from the emissions characteristics of the quantum dots.

McGrew teaches that the reader which gathers emitted fluorescence 660 from the illuminated label and then analyzes its spectral and temporal properties may also be combined with readers (i.e. processors) using other technology such as a magnetic stripe reader (see Figures 4-5, paragraphs 35-36).

In view of the teaching of McGrew, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ an actual processor to process the data because having a machine readable apparatus allows for a faster, more efficient processing of the data. Furthermore, different interpretations of the data are able to be utilized (i.e. a processor/computer is able to run many different programs to obtain and decode data).

Regarding claim 18, Bawendi teaches that the processor is responsive to the intensity and emission spectra of the quantum dots to extract encoded information when it is taught that the information encoded by the quantum dots can be spectroscopically decoded, thus providing the location and/or identity of the particular item or component of interest (see col 3, lines 24-39).

12. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi as modified by McGrew and further in view of Brown.

Regarding claim 19, Bawendi as modified by McGrew fails to specifically teach that the processor includes a digital filter for removing noise.

Brown teaches a method for continuously checking the production of security printing machines that utilize security ink. Brown discloses that the control box represented on FIG. 9 has three connectors, one connector 41 for the machine and one connector 42, 43 for each detector. Connector 41 comprises the power supply for the control box and sensor and output signals for the machine control... All this information and all control box output signals (LEDS, relay and two open collectors) are controlled by the micro-controller 46. A digital filter inside the micro-controller 46 protects against

electrical noise, fast short-circuits or fast signal interruptions on both detector lines. Although a detector of a magnetic property of security ink has been described, similar devices can also be used to monitor other invisible security features such as IR, fluorescence or phosphorescence (see paragraphs 32-34). Hence, Brown teaches the use of a digital noise filter within a system to detect encoded security inks, including fluorescent ones.

In view of the teaching of Brown, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a digital noise filter in order to ensure that noise is removed and that spectral line separation is obtained because extraneous noise is detrimental to a system where effective reading of certain information is necessary. It is favorable to use a digital filter since digital filters attain much better signal to noise ratios than analog filters, which allows for a more efficient system because less noise is interfering with the signal which contains the information.

Regarding claim 20, Bawendi teaches that the number of discrete emissions that can be distinctly observed for a given composition depends not only upon the monodispersity of the particles, but also on the deconvolution techniques employed. Quantum dots, unlike dye molecules, can be easily modeled as Gaussians and are therefore more easily and more accurately deconvoluted (see col 7, lines 2-9).

13. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi as modified by McGrew and further in view of MacKinnon (U.S. Patent No. 6,721,471). The teachings of Bawendi as modified by McGrew have been discussed above.

Bawendi as modified by McGrew fails to teach the specific arrangement of having the detector coupled to the light source by a first optical fiber surrounded by a bundle of optical fibers connected to the light source, and further, that the bundle of optical fibers terminate in an inverted funnel.

MacKinnon teaches that, in some aspects the present invention provides a fiber optical switching system for use with a light source and detector, comprising: an optical switch having a movable actuator; an optical fiber coupled to the actuator and terminating substantially at an end surface thereof for conducting light from the light source to the optical switch mechanism; a flexible film, or other mechanical element whose surface is conditioned to provide at least two fluorescent surfaces that when illuminated by light of a shorter wavelength, will emit light at a longer wavelength; wherein each of the two or more fluorescent surfaces emit light in different wavelength regions when excited by the same shorter wavelength illumination and are positioned such that an end surface of the optical fiber abuts or is placed in close proximity to the film throughout its movement from one fluorescent surface to another, wherein light emitted by the fluorescent surface is collected by the optical fiber: and, a detector coupled to an end of the optical fiber for detecting light emitted from the fluorescent film into the optical fiber so as to determine from which fluorescent surface of the film light has been emitted (see Figure 19, col 11, lines 34-53). Hence MacKinnon teaches that optical fibers, and bundles thereof, are used in order to connect light sources with detectors in a system that is able to process fluorescent samples. Notice also the funnel shape at the end of light guide 142 in Figure 19.

In view of the teaching of MacKinnon, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a fiber optic cable and bundle thereof to connect the detector to the light source because the use of a fiber optic cable ensures that the light is able to be directed to the destination efficiently, and further, a funnel allows for even more concentrated light guidance so that the optimum amount of illumination necessary for the system is attained.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ***Lisa M. Caputo*** whose telephone number is **(571) 272-2388**. The examiner can normally be reached between the hours of 8:30AM to 5:00PM Monday through Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Lee can be reached at **(571) 272-2398.** The fax phone number for this Group is (571) 273-8300.

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [**lisa.caputo@uspto.gov**].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lisa M. Caputo
AU 2876
September 30, 2005